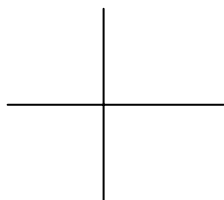


Consider variations of the basic parametric equations for a circle. Illustrate the variations given below. Include the starting point and direction.

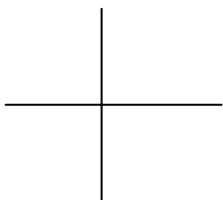
$$1. \begin{cases} x = 2 \cos t \\ y = 2 \sin t \end{cases}$$

$$0 \leq t \leq 2\pi$$



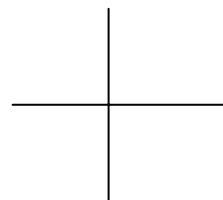
$$2. \begin{cases} x = \cos(3t) \\ y = \sin(3t) \end{cases}$$

$$0 \leq t \leq \frac{2\pi}{3}$$



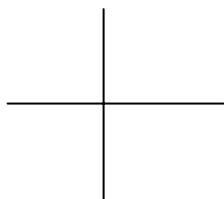
$$3. \begin{cases} x = \cos(t+2) \\ y = \sin(t+2) \end{cases}$$

$$0 \leq t \leq 2\pi - 2$$



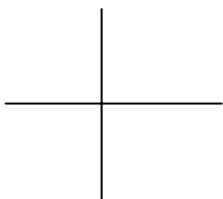
$$4. \begin{cases} x = \sin t \\ y = \cos t \end{cases}$$

$$0 \leq t \leq 2\pi$$



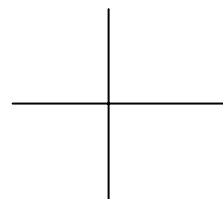
$$5. \begin{cases} x = \cos(t^2 - t) \\ y = \sin(t^2 - t) \end{cases}$$

$$0 \leq t \leq 3$$



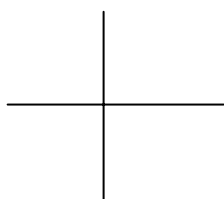
$$6. \begin{cases} x = 3 \cos t \\ y = 2 \sin t \end{cases}$$

$$0 \leq t \leq 2\pi$$

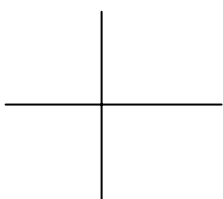


$$7. \begin{cases} x = \cos(-t) \\ y = \sin(-t) \end{cases}$$

$$0 \leq t \leq 2\pi$$



$$8. \begin{cases} x = 3 + \cos t \\ y = -1 + \sin t \end{cases}$$



Try graphing these for fun. Follow the settings carefully.

$$1. \begin{cases} x = \sin(3t) \\ y = \sin(4t) \end{cases}$$

$$0 \leq t \leq 6.3$$

$$tstep = 0.05$$

$$-1 \leq x \leq 1$$

$$-1 \leq y \leq 1$$

Radian mode

Zoom Square

$$2. \begin{cases} x = 8\cos t + 5\cos(4t) \\ y = 8\sin t - 5\sin(4t) \end{cases}$$

$$0 \leq t \leq 2\pi$$

$$tstep = 0.05$$

$$-15 \leq x \leq 15$$

$$-15 \leq y \leq 15$$

Radian mode

Zoom Square

$$3. \begin{cases} x = \sin(t + \sin t) \\ y = \cos(t + \cos t) \end{cases}$$

$$0 \leq t \leq 6.3$$

$$tstep = 0.05$$

$$-1.5 \leq x \leq 1.5$$

$$-1.5 \leq y \leq 1.5$$

Radian mode

Zoom Square

Axes Off

$$4. \begin{cases} x1 = t \\ y1 = \sqrt{1-t^2} + |t| \end{cases}$$

$$\begin{cases} x2 = t \\ y2 = -\sqrt{1-t^2} + |t| \end{cases}$$

$$-1 \leq t \leq 1$$

$$tstep = 0.05$$

$$-1.2 \leq x \leq 1.2$$

$$-1 \leq y \leq 1.6$$

Zoom Square

Axes Off

Simultaneous mode

$$5. \begin{cases} x1 = \cos t \\ y1 = \sin t \end{cases}$$

$$\begin{cases} x2 = t \\ y2 = \sin t \end{cases}$$

$$0 \leq t \leq 2\pi$$

$$tstep = 0.05$$

$$-1.5 \leq x \leq 2\pi$$

$$-1.5 \leq y \leq 1.5$$

$$xscl = \pi/4$$

$$yscl = 1$$

Radian mode

Zoom Square

Simultaneous mode

$$\begin{cases} x_1 = 8\cos t \\ y_1 = 8\sin t \\ x_2 = -3 - 1.5\sin t \\ y_2 = 3 - 1.5\cos t \\ x_3 = 3 + 1.5\cos t \\ y_3 = 3 - 1.5\sin t \\ x_4 = 4.5\sin t \\ y_4 = -4 + 0.75\cos t \\ x_5 = t / ((t < 0.95) \text{ and } (t > -0.95)) \\ y_5 = -4.5(\text{abs}(t) - 2.55) \\ x_6 = \cos\left(\frac{t}{2}\right) \\ y_6 = \sin t \end{cases}$$

$$-\pi \leq t \leq \pi$$

$$tstep = 0.25$$

$$-10 \leq x \leq 10$$

$$-10 \leq y \leq 10$$